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Life cycle impact of the European forestry-wood chain (FORMIT project)

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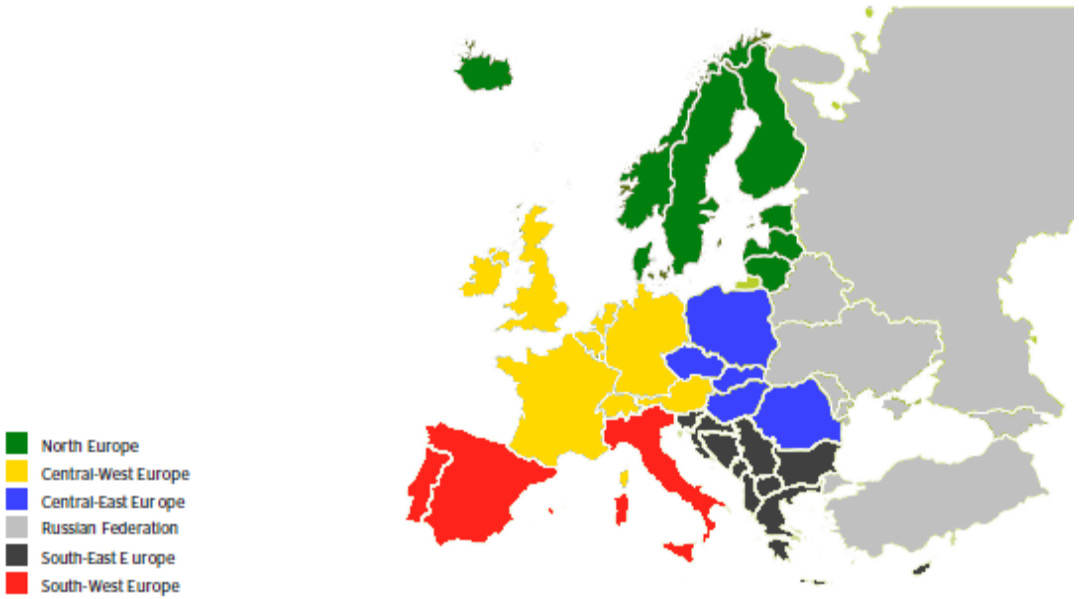
This project is funded by the European Union

FORest management strategies to enhance the MITigation potential of European forests

The FORMIT Project

- **The FP7 project "FORest management strategies to enhance the MITigation potential of European forests" aims to develop forest management scenarios (namely Business as usual, Climate adaptation, Conservation, Bioenergy, Material substitution) for carbon sequestration in Europe, including mitigation measures and management strategies and taking into account also carbon storage in forest products and forest soils and substitution of fossil fuels through biomass**



FORMIT
Work packages

WP1: Assessment of total carbon storage in European forests
Inventories, current state, history

WP2: Effects of forest management strategies on carbon storage and other forest functions
SRF, coppice, plantations, CCF, unmanaged forest, C&I

WP3: Contribution of forest products to carbon storage & mitigation
Storage, substitution, LCA, foot printing

WP4: Socio-economics of forest management strategies for carbon storage & mitigation
socio-economics, carbon, ecosystem services, C&I

WP5: Scenarios of forest management strategies for carbon storage & mitigation in Europe
Management scenarios, carbon budget, mitigation capacity

WP6: Project coordination and management
Coordination, monitoring, financial control, reporting

WP7: Dissemination of results
Information exchange, dissemination of results to user groups, scientific publication, synthesis volume, dissemination to general public

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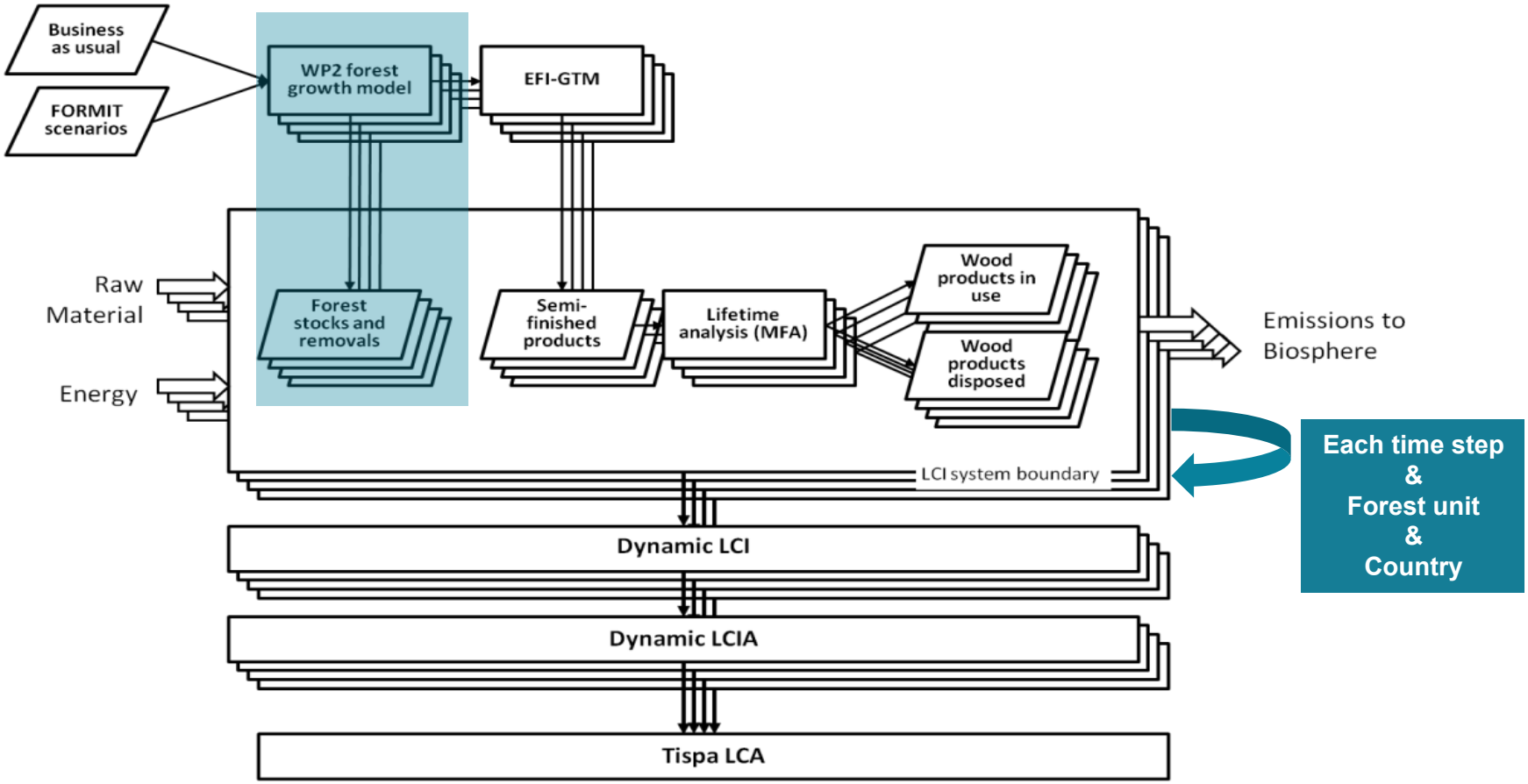
The overall approach



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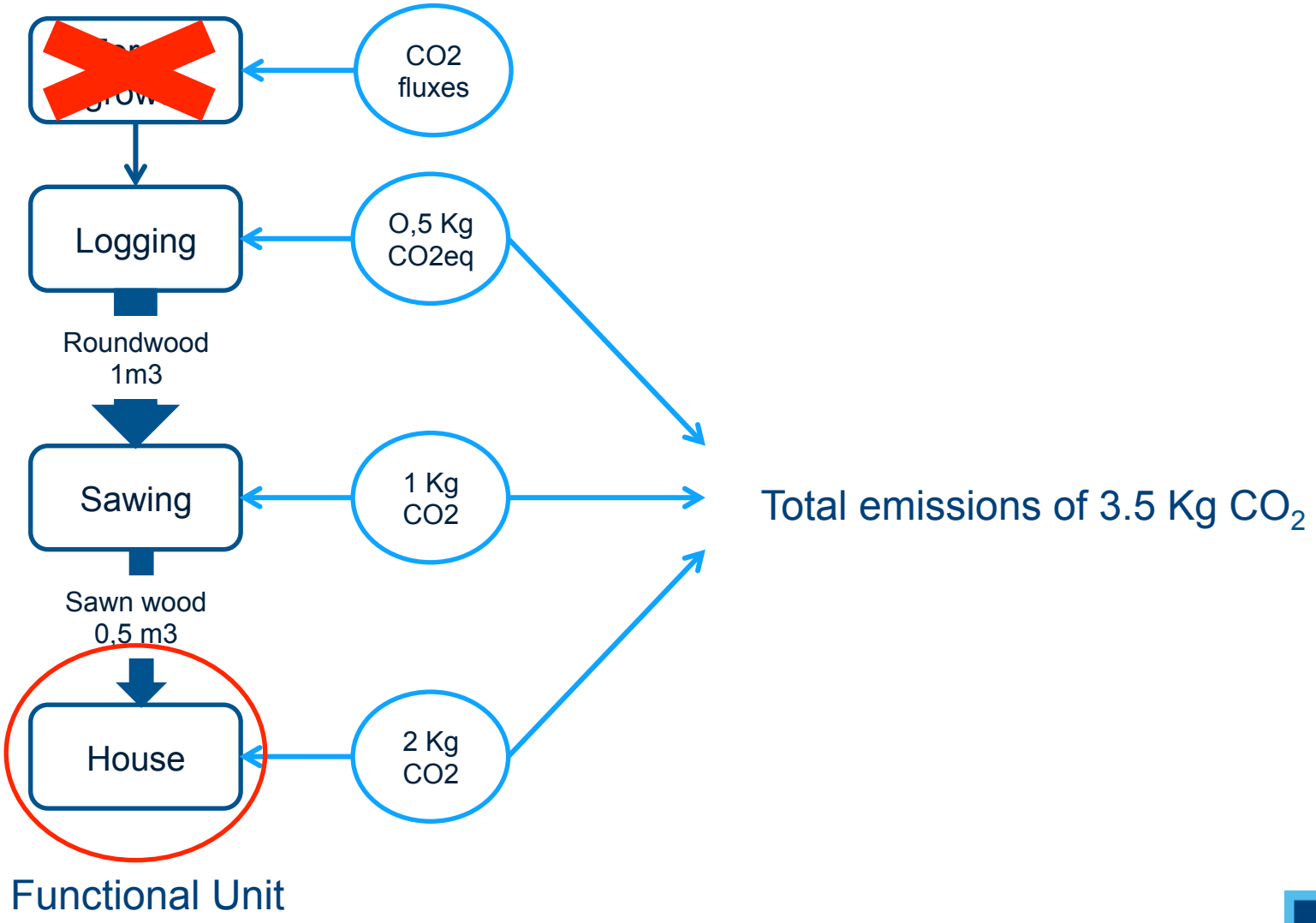
Static vs dynamic LCA: Brightway2-temporalis



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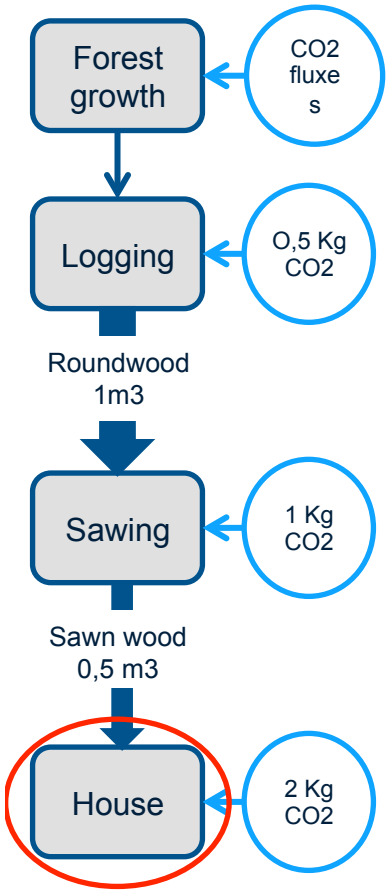
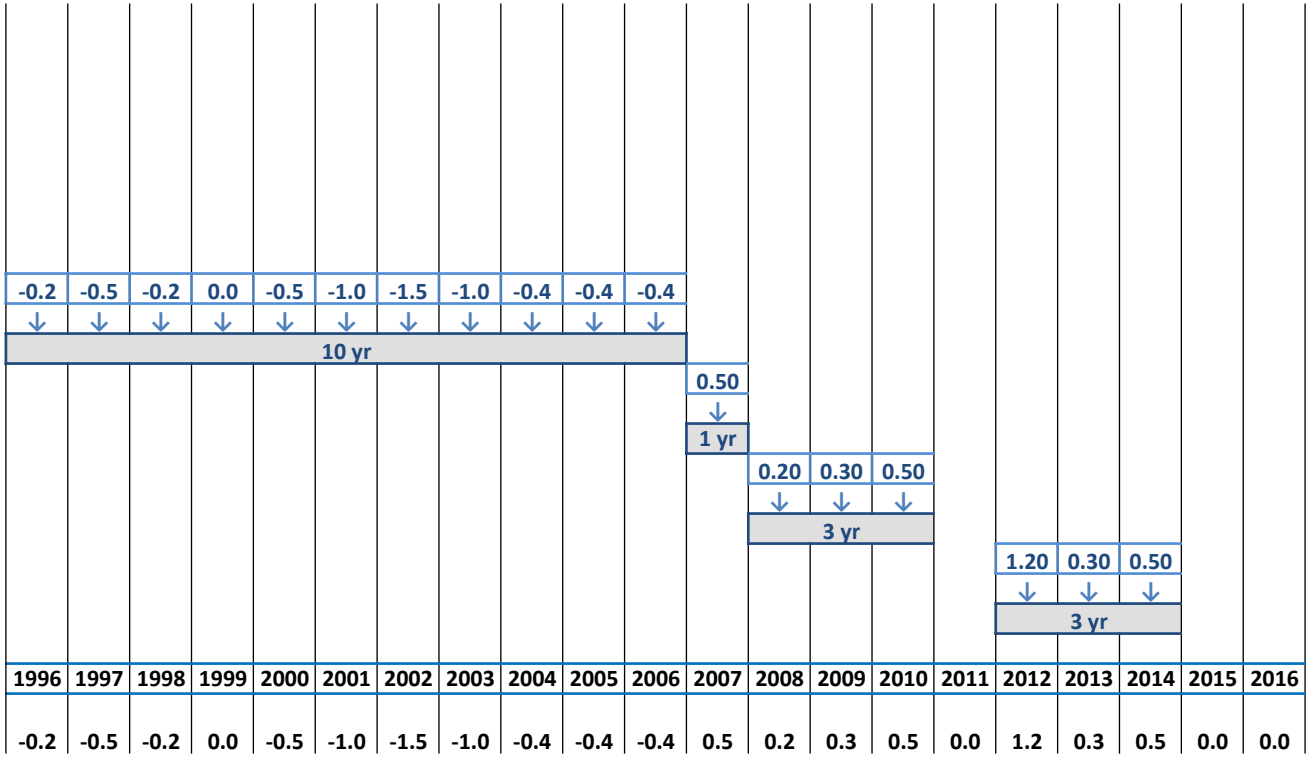


Functional Unit



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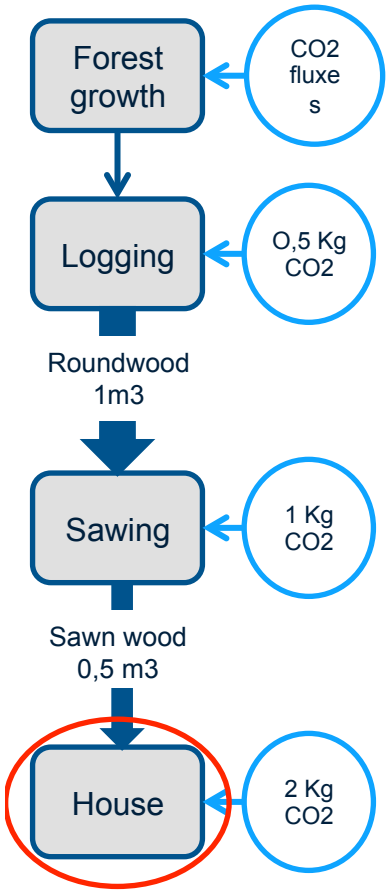
Website: brightwaylca.org, brightway2-temporalis.readthedocs.org

Static vs dynamic LCA: Brightway2-temporalis



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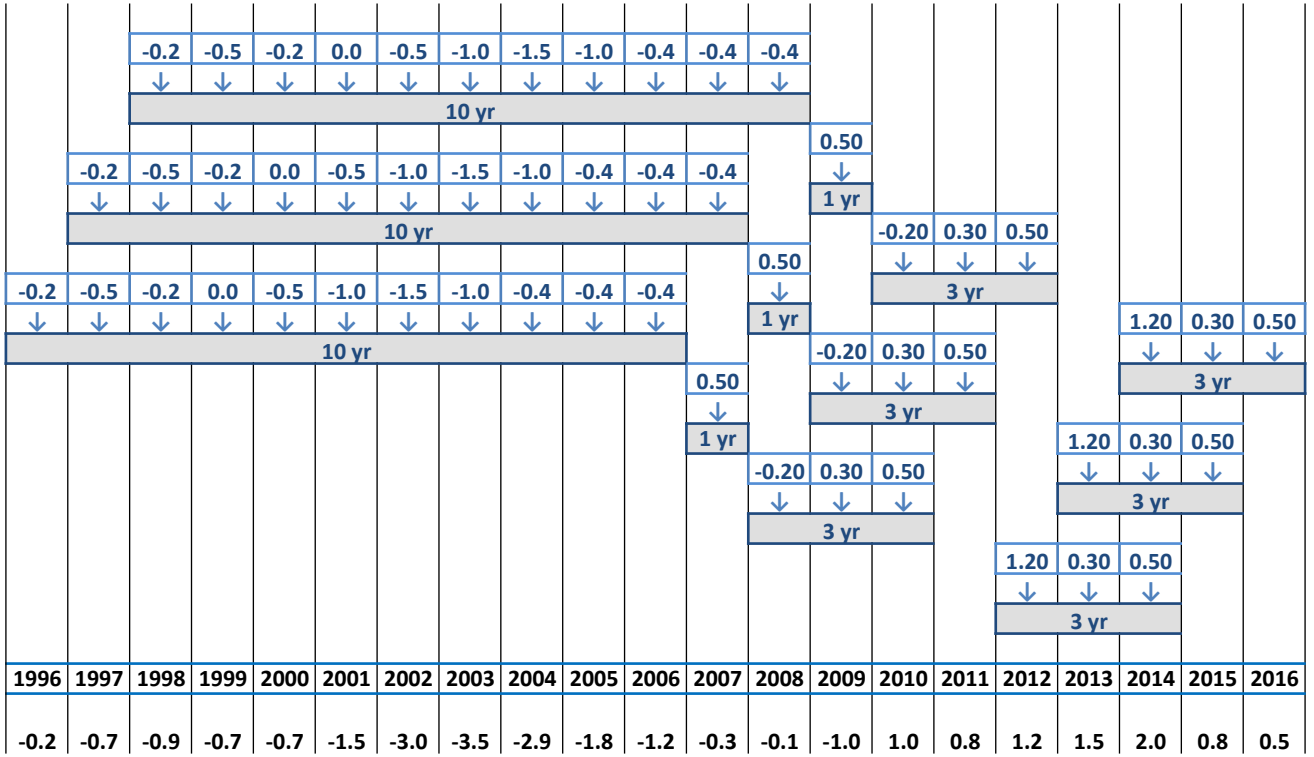

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Classifying what we have: the Forest Units

Tree species (grouped according to their growing style)

Code	Species group	Species
1	**Light demanding conifers**	Pinus sylvestris,Larix spp., Pinus nigra, Pinus cembra, Pinus heldreichii, Pinus leucodermis, Pinus radiata, Pinus uncinata, Pinus mugo, Pinus contorta, Pinus strobus, Cedrus spp., Juniperus spp.
2	**Shade tolerant conifers**	Picea abies, Abies spp., Pseudotsuga menziesii, Thuja spp., Taxus baccata, Tsuga spp., Chamaecyparis spp.
3	**Mediterranean conifers**	Pinus pinaster, Pinus halepensis, Pinus pinea, Pinus canariensis, Cupressus spp., Pinus brutia
4	**Fast growing deciduous**	Betula spp., Populus spp., Alnus spp., Salix spp., Robinia pseudoacacia, Eucalyptus spp.
5	**Slow growing light demanding deciduous**	Quercus robur, Q. petraea, Q. cerris, Q. pubescens, Q. faginea, Q. frainetto, Q. macrolepis, Q. pyrenaica, Q. rubra, Q. trojana, Q. hartwissiana, Q. vulcanica, Q. macranthera, Q. libani, Q. brantii, Q. ithaburensis, Q. pontica, Fraxinus spp., Castanea sativa, Rosaceae (Malus, Pyrus, Prunus, Sorbus, Crataegus, etc.), Juglans spp., Cercis siliquastrum
6	**Slow growing shade tolerant deciduous**	Fagus spp., Carpinus spp., Tilia spp., Ulmus spp. , Buxus sempervirens, Acer spp. Ilex aquifolium
7	**Mediterranean evergreen trees**	Quercus suber, Quercus ilex, Q. coccifera, Q. lusitanica, Q. rotundifolia, Q. infectoria, Q. aucheri, Tamarix spp. Arbutus spp., Olea europea, Ceratonia siliqua, Erica spp. Laurus spp., Myrtus communis, Phillyrea spp. Pistacia spp. Rhamnus spp. (R. oleoides, R. alaternus), Ilex canariensis, Myrica faya

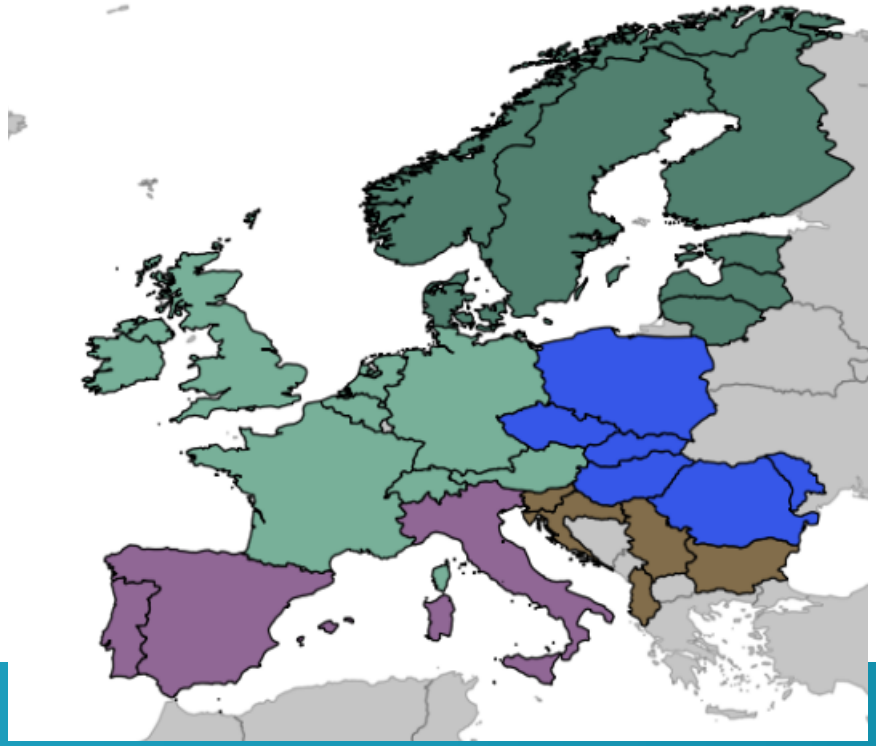
Silvicultural systems

Code	System	Definition
1	**Unmanaged forests**	No management
2	**Continuous cover forest management**	Continuous cover forest management • Selection cuttings based on diameter
3	**Even-aged forest management with shelterwood**	Even-aged (2-layer) forest management • Regeneration: natural • Thinnings • Shelterwood cut after certain mean diameter (or age) has been reached
4	**Even-aged forest management: Uniform clear-cut system**	Uniform forest management • Regeneration: planting or natural • Thinnings • Clear-cut after certain mean diameter (or age) has been reached
5	**Coppice**	Woodland which has been regenerated from shoots formed at the stumps of the previous crop trees, root suckers, or both, i.e. by vegetative means
6	**Coppice with standards**	Coppice system under low density uneven-aged high forest
7	**Short rotation**	Plantation forestry including exotic species

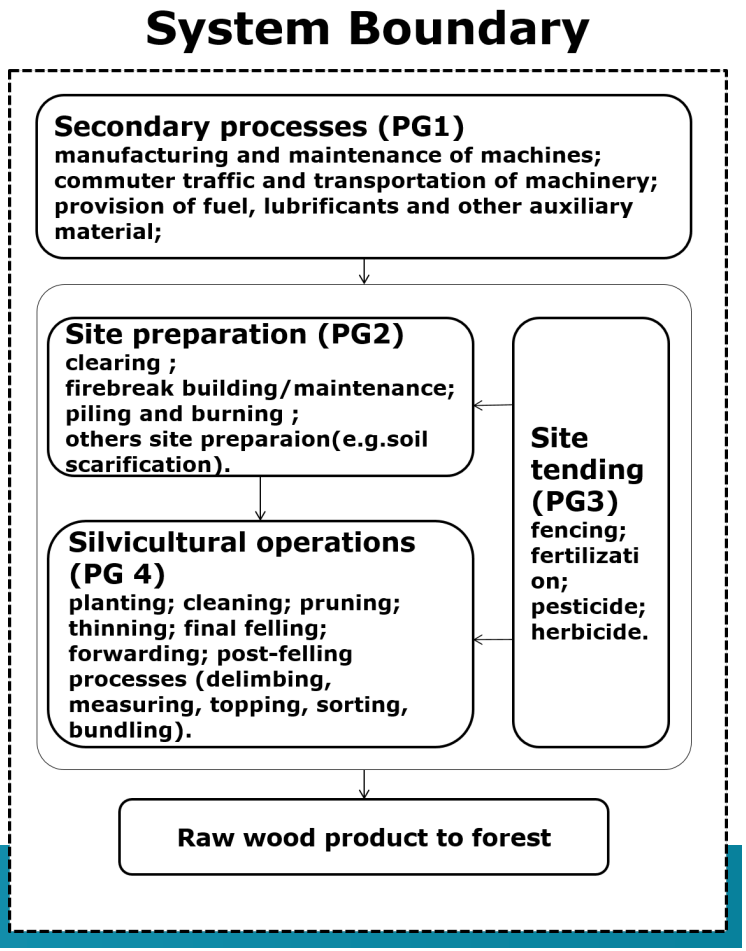
49 Forest Units

Life cycle inventory development: the questionnaire

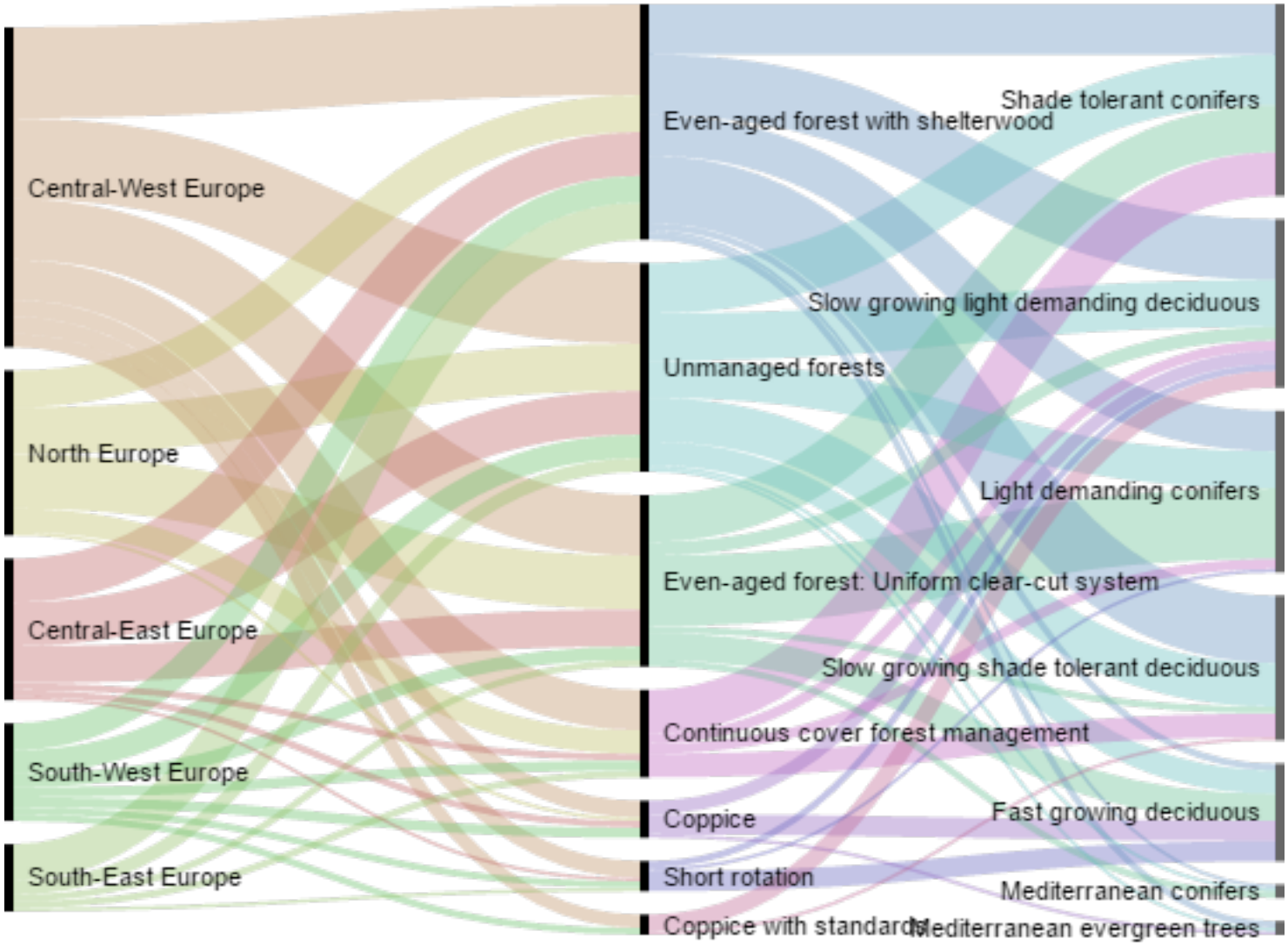
- **Geographic boundary: 28 European Countries by Forest Unit**
- **Geographic resolution: Forest Unit**
- **Temporal boundary: from 2010 to 2100**
- **Temporal resolution: rotation length of the forest unit**



- **System boundary: primary and secondary processes as defined by Klein (2015) till landing (cradle-to-gate)**



Identifiyng what we have: the European forests



- **28 Countries**
- **173 (out of 237) actively managed Forest units**
- **1799 Interventions characterized**

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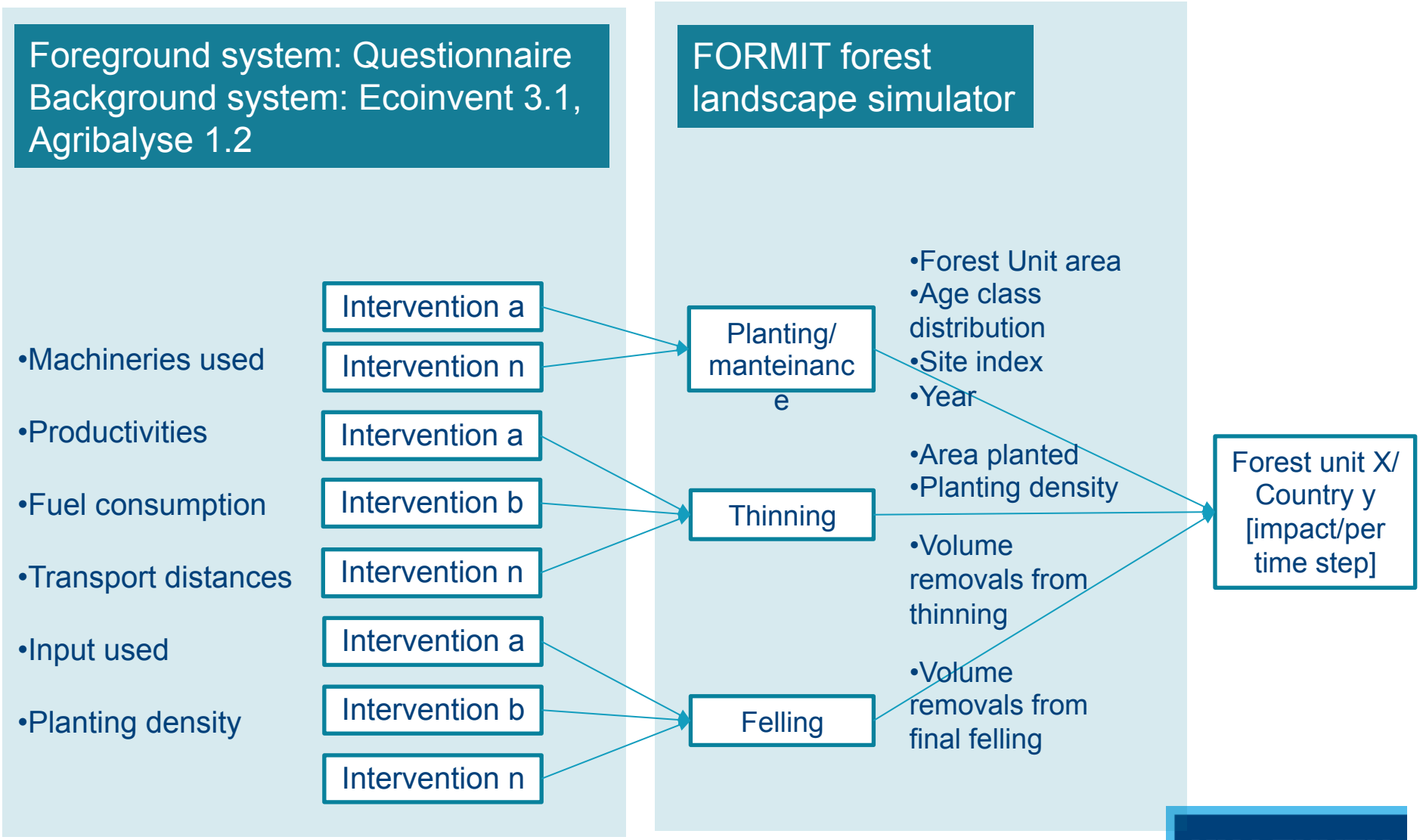
Life cycle inventory development: the modelling



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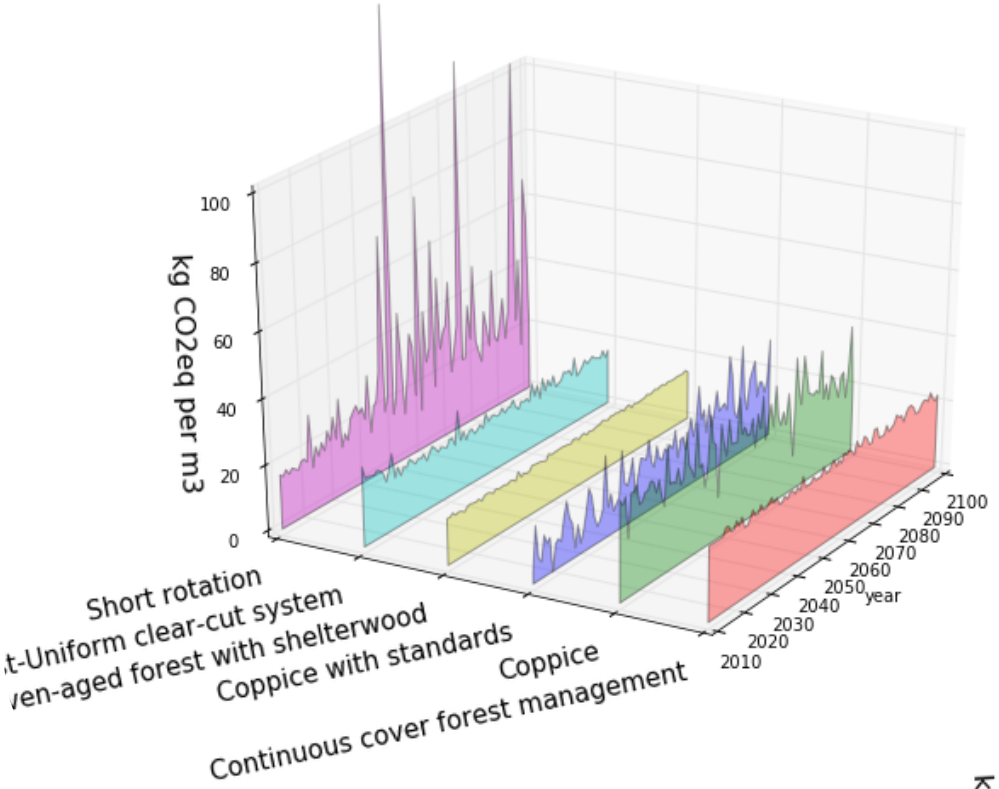
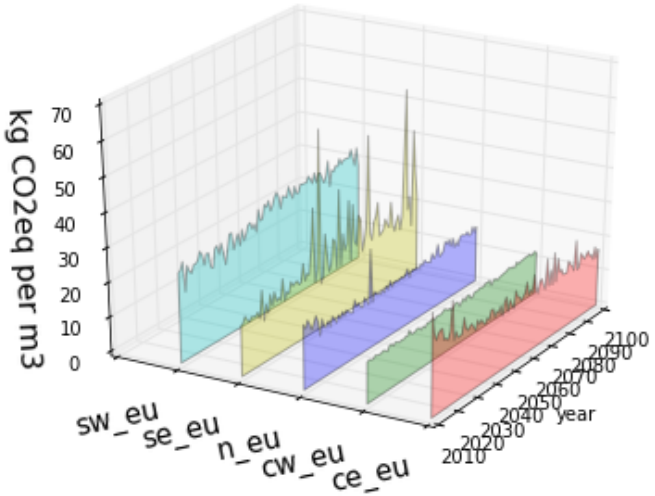
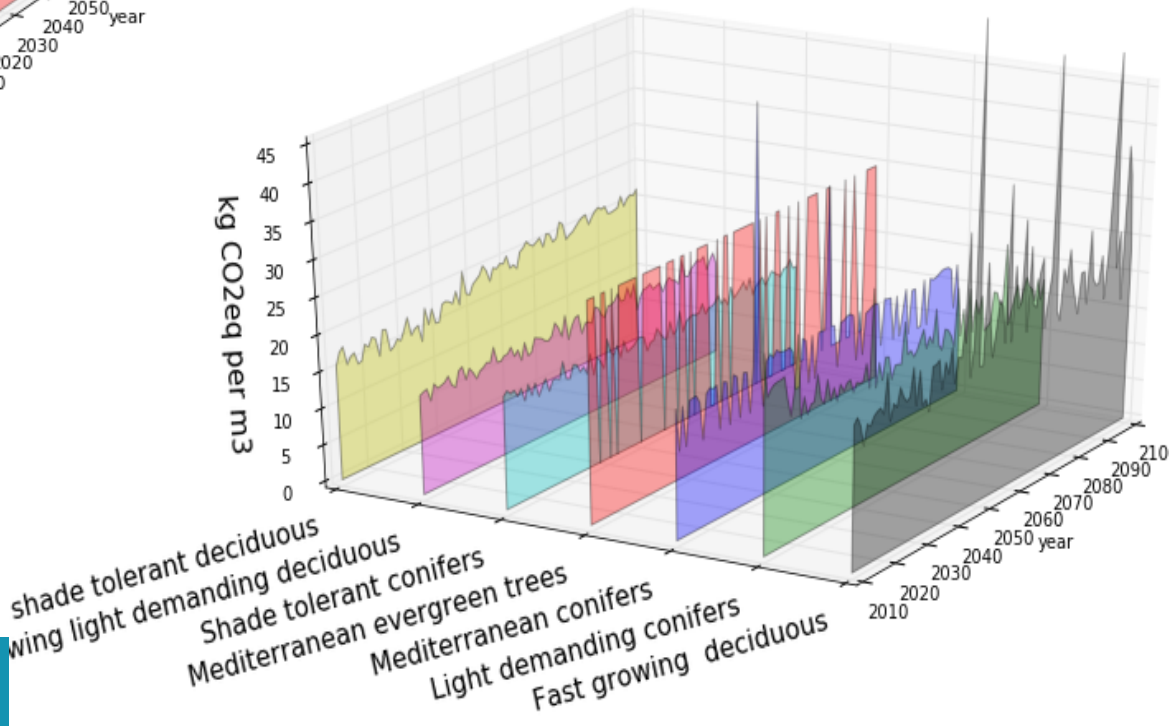
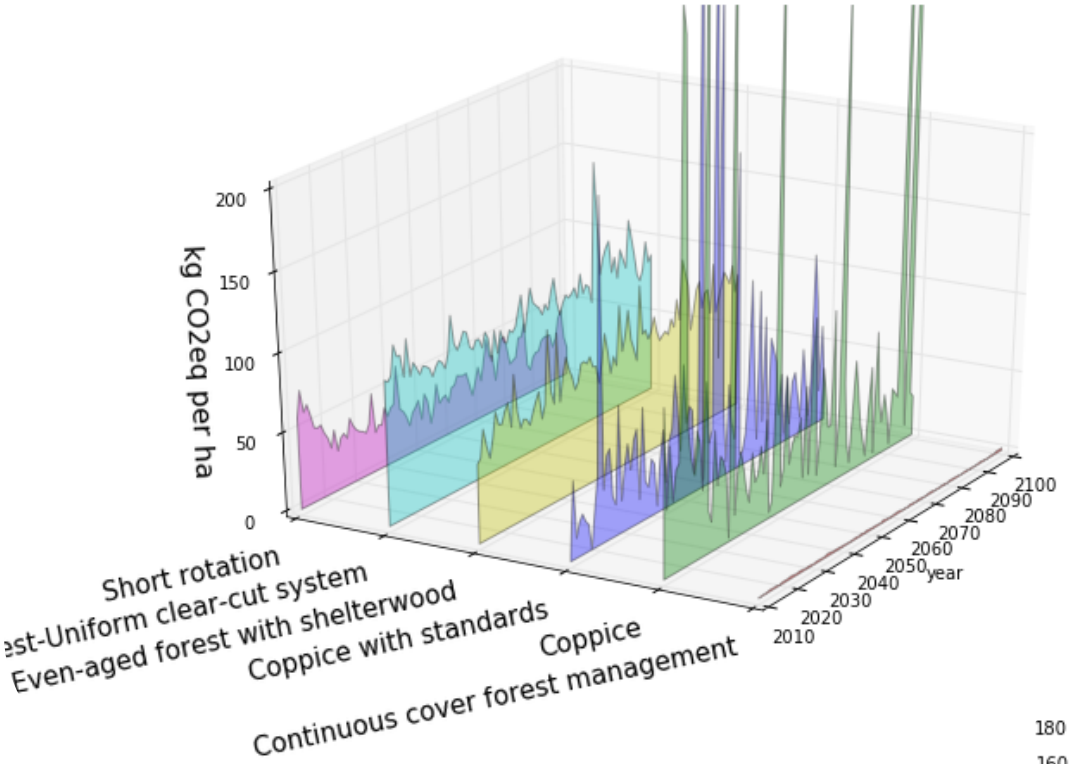
LCA results: FU=m3 over bark harvested

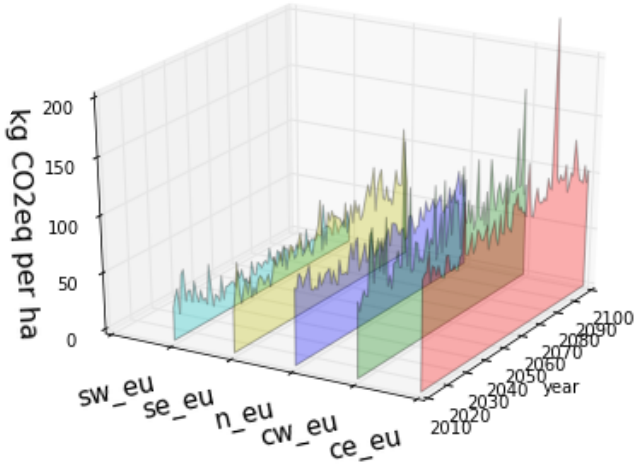


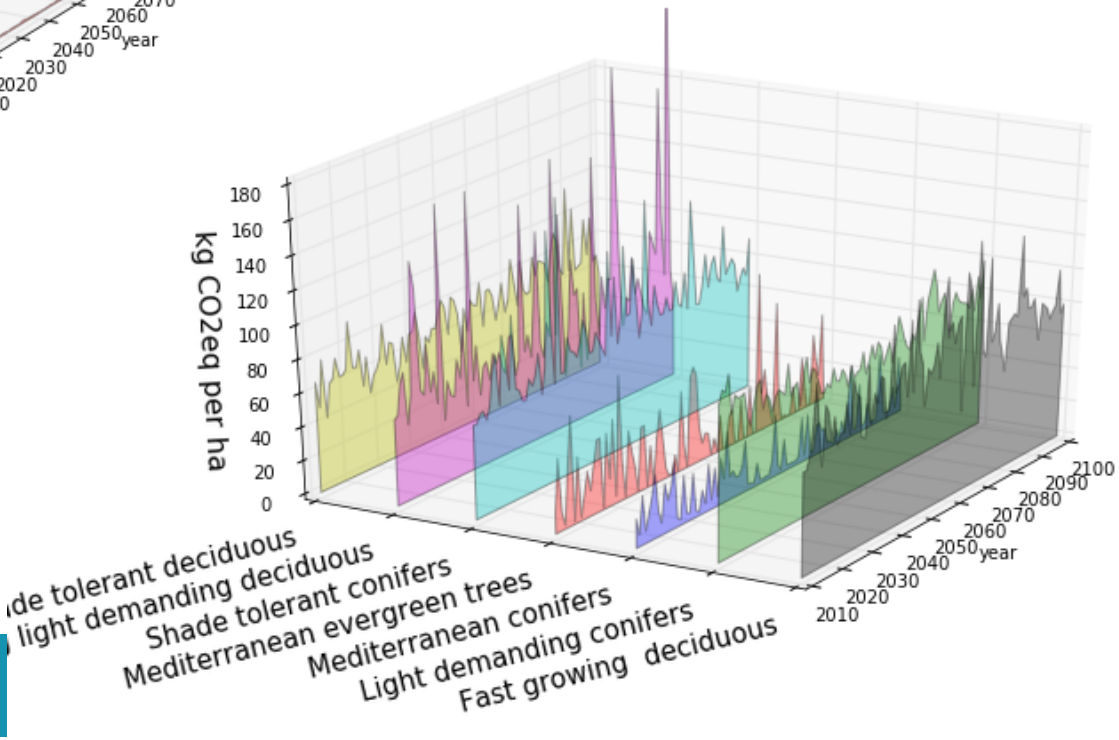




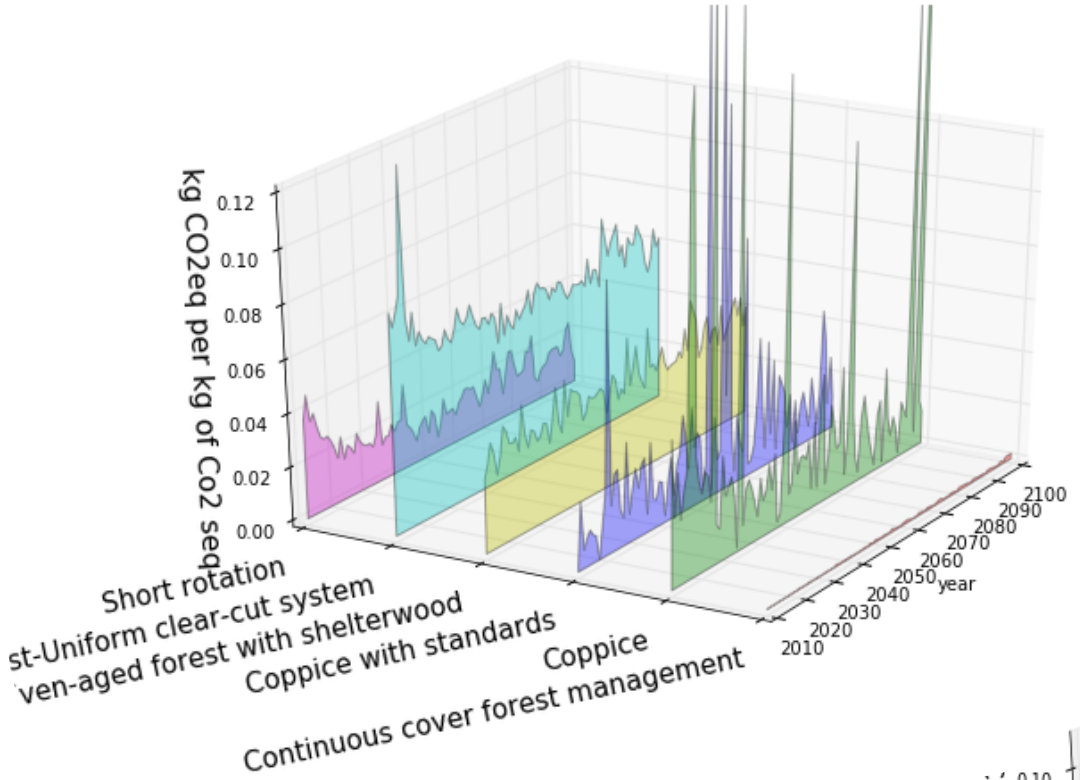
LCA results: FU=1 hectare of forest

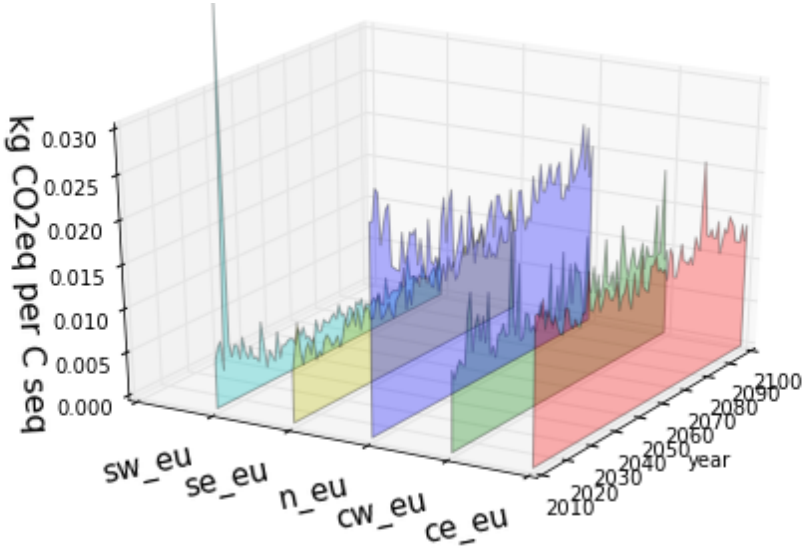


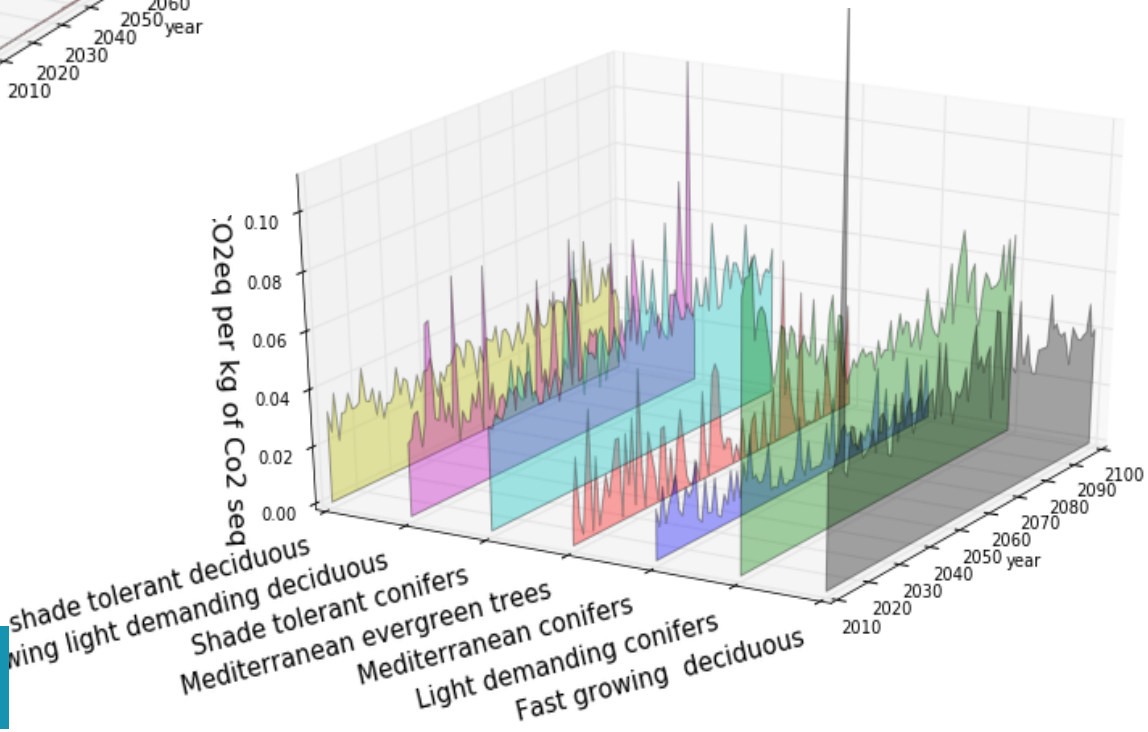




LCA results: FU=Co2 sequestered (NPP)







Conclusions

- Temporal explicit LCA can help to better understand dynamic/with long life cycle systems as for the forest ones
- Depending on the management types, species groups and geographical regions the impacts can be rather different
- The impact on climate change of the management is negligible compared to Co2 the sequestered by forests....BUT(!)….the picture is not complete without considering the other steps of the life-cycle of wood


THANKS FOR
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AND
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